SMALL-SIZED PORTABLE INFORMATION PROCESSING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a small-sized portable information processing apparatus. More particularly, this invention relates to a small-sized portable information processing apparatus, such as a portable calculation machine, a portable computer, a portable word processor, an electronics note book or the like, having an information indication display, such as a liquid crystal display, or the like.

2. Description of the Related Art

It is required that a small-sized portable information processing apparatus be easily operated with a pen or the like operating element as well as being small-sized, lightweight, and easily portable. Therefore, an apparatus body, i.e., a housing, or case, is provided with a keyboard integral therewith. A liquid crystal display, which functions as a touch input panel, is pivotably attached to the apparatus body by means of a hinge, so that the liquid crystal display can be pivotably moved by approximately 360° with respect to the apparatus body. In such an apparatus, it is possible to input through the keyboard while watching the display and also possible to directly input to the liquid crystal display through a pen or the like after the liquid crystal display is pivotally moved (i.e., rotated) by 360° with respect to a closed position relatively to the apparatus body.

FIGS. **16**(*a*) and **16**(*b*) are perspective views of such a portable apparatus known in the prior art, in which FIG. **16**(*a*) shows the liquid crystal display opened to an obtuse angle position, relatively to the closed position with respect to the apparatus body so that the keyboard can be operated and FIG. **16**(*b*) shows that the liquid crystal display is pivotably moved by 360° with respect to the closed position thereof so that the liquid crystal display can face upwards to allow direct input thereto by a pan or the like. As shown in these drawings, the apparatus comprises an apparatus body **1**, a keyboard **2** integrally provided on the top of the apparatus body, a liquid crystal display **3** having its display surface as a touch panel and a hinge member **5** having two pivot shafts **5***a* and **5***b*.

As shown in these drawings, the liquid crystal display **3** is connected to the apparatus body **1** by means of the hinge member **5** having two pivot shafts **5***a* and **5***b*. More particularly, the rear edge of the liquid crystal display **3** is connected to one pivot shaft **5***a* of the hinge member **5** and the other pivot shaft **5***b* is connected to the rear edge of the apparatus body **1**.

As shown in FIG. **16**(*a*), when the liquid crystal display **3** is rotated to a predetermined angle (an obtuse angle) with respect to the keyboard **2**, it is possible to input through the keyboard while watching the display. Also, as shown in FIG. **16**(*b*), it is also possible to pivotably move the liquid crystal display by 360° with respect to the apparatus body **1** from its closed position so that information can be directly input through the pen **4** to the liquid crystal display **3** which functions as a touch panel.

The liquid crystal display **4** is substantially rectangular in shape. Therefore, in a state of FIG. **16**(*a*), it is preferable to set the apparatus so that the operator can input through the keyboard **2** while watching the liquid crystal display **3**. On the contrary, in a state of FIG. **16**(*b*), it is preferable to set the apparatus so that the operator can input through the liquid crystal display **3** using a pen **4** or the like.

Therefore, as shown in FIGS. **17**(*a*) and **17**(*b*), a display changing actuation position **17** is conventionally provided in the liquid crystal display **3** so that, when the operator touches this position with a tip of the pen **4**, the orientation of the liquid crystal display **3** is turned by 90°. If the position is touched again, the orientation of the liquid crystal display **3** is turned back to the initial state.

Another actuation position for keyboard lock or operation invalidation is also provided in the liquid crystal display **3** so that, when the operator touches this actuation position with the pen **4**, the function of the keyboard is locked or all or part of the operations are invalidated. If this actuation position is touched again, the keyboard lock or operation invalidation is released.

In this known portable information processing apparatus, the operator must use a pen **4** to touch the display changing position **17** every time the operator intends to change the liquid crystal display **3**. Also, the operator must use the pen **4** to touch the display changing position **17** to change the display back to the initial state. Such an operation necessarily is somewhat troublesome.

Unexamined Patent Publications (Kokai) Nos. 62-6295 and 62-17786 suggest a small-sized image display apparatus in which a matrix panel (liquid crystal display) is rotatable by 360° with respect to the apparatus body and the panel is changed to either light transmitting type or light reflecting type in accordance with the luminous intensity exerted on the matrix panel.

In these prior art, although the matrix panel is automatically changed to either light transmitting type or light reflecting type in accordance with the luminous intensity exerted on the panel, this image display changing apparatus is not of a type in which the display is automatically changed in accordance with the state of use.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a small-sized portable information processing apparatus, in which the liquid crystal display can automatically be changed without using a pen or the like, but by only rotating the liquid crystal display with respect to the apparatus body so as to change its state of use.

Another object of the present invention is to provide a small-sized portable information processing apparatus, in which the function of the keyboard is locked or all or a part of the operations are automatically invalidated, by rotating the liquid crystal display with respect to the apparatus body so as to change its state of use.

According to the present invention, there is provided a small-sized portable information processing apparatus comprising: an apparatus body; a display panel pivotably attached to the apparatus body, the display panel having a plurality of data display orientations therein; detecting means for detecting an angle between the apparatus body and the display; and changing means for selecting one of the orientations of the display panel in accordance with a result from the detecting means. Thus, the orientation of the display can be easily and automatically changed by only pivotably moving the liquid crystal display panel.

The display panel is pivotably movable by up to approximately 360° with respect to the apparatus body by means of a pivot shaft provided therebetween and a to switch performs an ON-OFF operation thereof in accordance with relative rotation between the display panel and the apparatus body about the pivot shaft. Thus, the orientation of the display can be easily and automatically changed by a switch ON-OFF operation.